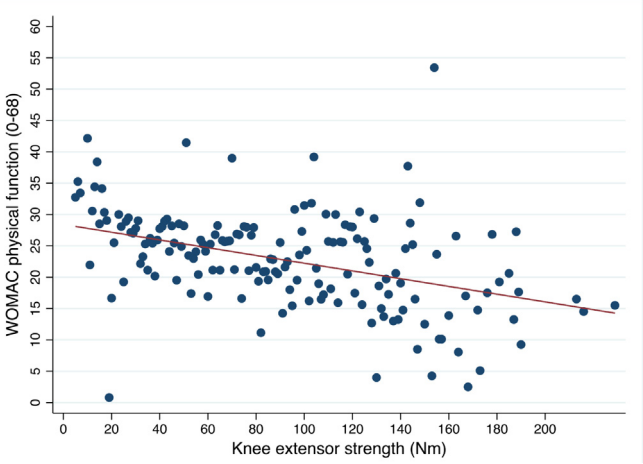

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INCIDENCE AND BURDEN OF HOSPITAL-TREATED SPORTS INJURY IN PEOPLE AGED 15+ YEARS IN VICTORIA, AUSTRALIA, 2004-2010: FUTURE EPIDEMIC OF OSTEOARTHRITIS?

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Purpose: Previous sports injury is a known risk factor for subsequent osteoarthritis, but population-based rates of sports injury are unknown. Osteoarthritis places a large burden on health care systems. Any increase in the incidence of joint-related sports injuries is likely to further increase this burden. Therefore a greater understanding of the rate and burden of sports injury, is urgently required if a potential future epidemic of OA is to be avoided. The aims of this study were to: i) describe the trends in the population incidence and burden of all hospital-treated sports injury in Victoria, Australia in adults aged 15+ years; ii) determine the incidence of sports-relates lower limb and knee injuries as a subset of these injuries; and iii) quantify their population health burden in terms of direct hospital treatment cost and length of stay.
Methods: Health sector data relating to people aged 15+ years, for the calendar years 2004-2010 inclusive, was extracted from the Victorian Admitted Episodes Dataset and Victorian Emergency Minimum Dataset. Data relating to sports injuries were identified using International Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modifications (ICD-10-AM) diagnosis codes S70-S99, which included injuries to the hip, thigh, knee, lower leg, ankle, foot and toes. Knee and lower leg injuries, as a subset of all lower limb injuries were identified using the codes S80-S89; while dislocation, sprain or strain of the joints and ligaments of the knee were identified using the code S83. Rates of sports participation were collected from annual Exercise, Recreation and Sport Surveys. Trends in injury frequency and rates were determined. Economic burden was calculated as the average Victorian cost per Australian Refined Diagnosis Related Group (AR-DRG) for the relevant year for each admission.
Results: Between the dates January 2004 and December 2010 there were 165,496 hospital treated sports injuries in people aged 15+ years in Victoria, Australia. Of these, 59,399 (35.9% of all sports injury cases) were lower limb injuries, 29,430 (17.8%) were injuries to the knee and lower leg and 11,749 (7.1%) were knee dislocations, strains and sprains. The overall annual rate of hospital treated sports injuries increased by 24% (p=0.001) over the 7-years. The annual rate of lower limb sports injuries increased by 26% (p=0.001) over the 7-years. The associated accumulated economic burden was $265 million for all sports injuries and $110 million for lower limb injuries over the 7-years.
Conclusions: Previous sports injury is an important known risk factor for the development of osteoarthritis. Assuming a direct correlation between sports injury rates and the subsequent development of OA, it could be expected that this could lead to an increase in the population-level incidence of sports-related OA cases in coming decades. Importantly, a large number of sports injuries do not present at hospitals, and are instead managed by general practitioners, sports physicians and sports physiotherapists through primary referral. This suggests that our findings are a very conservative estimate, and the overall burden of sports injury is likely to be much greater than reported within the current study. The findings of this study have direct implications of the planning of health services to deal with more OA patients in the future. Population-wide preventive strategies that reduce the risk of sports injury are urgently required in order to reduce the future health care system burden of osteoarthritis and other conditions secondary to sports injury.

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PHYSICAL ACTIVITY AND THE RISK OF HIP OR KNEE REPLACEMENT DUE TO PRIMARY OSTEOARTHRITIS. A POPULATION BASED COHORT STUDY OF 66.863 PERSONS FROM THE HUNT STUDY

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Purpose: The relationship between leisure time physical activity (PA) and subsequent hip and knee joint replacement due to primary osteoarthritis (OA) have been inconclusive. Previous cohort studies have found that the risk of knee replacement (TKR) increases with more vigorous levels of PA. Others have found no overall relationship between PA and TKR or hip replacement (THR) at all, while one study reported a protective role of PA on the risk of THR for women. The study population, study design, definition of PA, covariates and follow-up time is heterogeneous, which makes it difficult to draw conclusions from existing studies. Thus, more prospective studies with sufficient power and adjustments for potential confounders are needed to further address the relationship between PA and OA. With respect to this, our aim was to estimate the association between leisure time PA and the risk of THR or TKR due primary OA in a large, unselected population.
Methods: The Health Study in Nord-Trøndelag (HUNT) includes large total population based cohorts, covering 125 000 Norwegian participants. The HUNT Study has collected data in three surveys; HUNT1 (1984-86), HUNT2 (1995-97) and HUNT3 (2006-08). All inhabitants aged ≥ 20 years of age were invited to participate. We included participants from HUNT2 and HUNT3 (n=74 938). The unique 11-digit identity number of Norwegian citizens enabled us to individual linkage between information in HUNT and data on the first primary joint replacement recorded in the Norwegian Arthtroplasty Register. The participants were followed until 2013. Leisure time PA was collected by questionnaires at baseline attendance and categorized into four activity levels; inactive, low, moderate and high. A total of 6965 participants were excluded because of a joint replacement prior to baseline in HUNT, missing date for the primary joint replacement, because they had died or emigrated before baseline in HUNT or did not have data on PA. Thus, 66 863 individuals were included for statistical analysis. A Cox proportional hazards model was used to calculated hazard ratios (HRs) according to level of PA with adjustments for confounding variables. In addition we performed stratified analysis according to age at baseline (<45, 45 -59 and ≥60 years) and sex.
Results: A total of 35 081 women and 31 782 men were included in the study. We identified 1923 (1177 THRs and 746 TKRs) joint replacements due to primary OA during 18 years of follow up. Mean age at joint replacement was 69.5 years (SD 9.4). The crude rate of THR and TKR indicated decreased risk by increasing levels of PA. However, in the multivariate Cox regression analysis high PA was associated with increased risk of THR (HR 1.29, 95% CI 1.09-1.51) and TKR, although not significant for TKR (Table 1). Further exploration in age strata showed a positive dose-respons association between PA and risk of THR in the youngest age group. High PA in this group resulted in a twice fold risk of primary THR (HR 2.04, 95% CI 1.36-3.06) compared to low PA. High PA was also associated with increased risk of THR in the middle-age group (HR 1.27, 95% CI 1.02-1.57), although the risk was reduced and with a non-significant trend. There was a dose-response association between PA and TKR in the youngest age group and moderate PA was associated with the risk of TKR in the middle-age group (HR 1.33, 95% CI 1.01-1.75). We found no association between leisure time PA and the risk of joint replacement for the oldest age group. The positive association between levels of PA and joint replacement first and foremost was related to the women.
Conclusions: In this population based cohort study with 18 years follow up, we found that increasing levels of leisure time PA are positively

associated with the risk of primary hip and knee replacement. The risk seemed to be strongest related to more vigorous levels of PA, for those under 45 years of age at baseline, and for women.

Table 1. Crude incidence rate and adjusted hazard ratios for THR and TKR by levels of PA

PA level	Person-years	No. of THRs	No. of TKRs	Incidence rate* THR	Incidence rate* TKR	Adjusted HR (95% CI)# THR	Adjusted HR (95% CI)# TKR
Inactive	60227	141	92	2.3	1.5	0.93 (0.76-1.17)	0.95 (0.72-1.25)
Low	579963	1080	674	1.9	1.2	1.00	1.00
Moderate	160285	187	127	1.2	0.8	1.02 (0.85-1.22)	1.14 (0.92-1.41)
High	158682	228	126	1.4	0.8	1.29 (1.09-1.51)	1.10 (0.89-1.36)
p (test for trend)						0.003	0.20

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PHYSICAL ACTIVITY AND 6-YEAR INCIDENCE OF FACET JOINT OSTEOARTHRITIS IN WOMEN AND MEN: THE FRAMINGHAM STUDY

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Purpose: Vigorous physical activity is often considered a risk factor for knee and hip osteoarthritis (OA), but its effect on spinal OA is poorly understood. Few risk factors for lumbar facet joint OA (FJ OA) have been identified, and even less is known about risk factors for thoracic FJ OA. We conducted a longitudinal study to determine whether physical activity increases the incidence of severe FJ OA in the thoracic and lumbar spine on computed tomography (CT) among community-dwelling women and men.

Methods: Study participants included 1,201 members (618 women, 512 men) of the Framingham Study with baseline and 6-yr follow-up scans acquired by multidetector CT (mean age 61 yr, range, 40-85 yr). A radiologist, blinded to clinical information, used an ordinal scale (0=normal, 1=mild, 2=moderate, or 3=severe) to evaluate presence and severity of FJ OA from T4-L5 on paired baseline and follow-up scans. A standardized atlas was used to identify severe FJ OA, indicated by any of the following: marked or total joint space narrowing, large osteophytes, severe articular process hypertrophy, severe articular erosions, severe subchondral cysts, or joint space vacuum phenomenon. Our primary outcome was incidence of severe thoracolumbar FJ OA defined at the participant level as having any joint that was graded as < 2 (moderate) at baseline that developed grade 3 (severe) by follow-up. Physical activity was assessed using the Framingham Physical Activity Index (PAI), a validated measure of metabolic work based on hours/day of heavy, moderate, light, and sedentary activity. We used logistic regression to calculate odds ratios (OR) and 95% confidence intervals (CI) for the association between physical activity (quartiles, Q1=low as reference) and incidence of severe FJ OA, adjusted for age and body mass index (BMI [kg/m2]). We also compared FJ OA incidence in individuals in the highest quartile of physical activity (Q4) versus lower levels of activity (Q1-Q3). Analyses were stratified by sex.

Results: 6-yr incidence of severe thoracolumbar FJ OA was 25% in women and 17% in men. Mean PAI (unitless, range 26.3-78.2) was 37 ± 6 in women and 38 ± 7 in men. FJ OA incidence was 15% in the lowest quartile (Q1) of physical activity and 23% in the highest quartile (Q4) in men, and 22% in the lowest quartile (Q1) and 28% in the highest quartile (Q4) in women (Table). Adjusted ORs did not increase with physical activity in men (OR =1.00 [Q1], 1.07 [Q2], 0.78 [Q3], 1.54 [Q4], trend p=0.29) or women (OR =1.00 [Q1], 1.01 [Q2], 1.34 [Q3], 1.38 [Q4], trend p=0.15). FJ OA incidence was similar in individuals in the highest quartile of physical activity compared to those in Q1-Q3 in men (OR=1.54 [95% CI 0.94-2.51] and in women (OR=1.08 [95% CI 0.67-1.74]).

Conclusions: We did not find a significant trend in increasing incidence of CT-detected thoracolumbar FJ OA with increasing level of physical activity in either women or men. A possible limitation of our study is that the physical activity index used may not accurately quantify mechanical loading involved in specific activities that may affect FJ OA risk. Nevertheless, these findings indicate that current recommendations for physical activity should not be altered due to concerns about increasing risk of FJ OA.

Association between physical activity and 6-year incidence of severe thoracolumbar facet joint OA

Physical Activity*	Men (N = 512)					Women (N = 618)				
	n	N	FJ OA Incidence %	OR#	95% CI	n	N	FJ OA Incidence %	OR#	95% CI
Quartile 1	19	129	15%	1.00	-	34	153	22%	1.00	–
Quartile 2	20	126	16%	1.07	0.54–2.12	36	158	23%	1.01	0.59–1.74
Quartile 3	17	129	13%	0.78	0.38–1.61	43	156	28%	1.34	0.79–2.28
Quartile 4	29	128	23%	1.54	0.80–2.95	42	151	28%	1.38	0.80–2.36
Trend, p				0.29					0.15	

* Framingham physical activity index (unitless) quartiles:Men 1=26.4-33.2, 2=33.3-36.9, 3=37.0-41.6, 4=41.7-71.0 Women 1=26.3-32.8, 2=32.9-35.9, 3=36.0-39.3, 4=39.4-78.2

Adjusted for age (years) and body mass index (kg/m2)

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THE PREVALENCE OF SYMPTOMATIC KNEE OSTEOARTHRITIS IN CHINA: RESULTS FROM CHINA HEALTH AND RETIREMENT LONGITUDINAL STUDY

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Purpose: To describe the prevalence of symptomatic knee osteoarthritis (SxOA) in Chinese population.

Methods: China Health and Retirement Longitudinal Study (CHARLS) is a nationwide population-based longitudinal survey among Chinese retired population. Individuals (age ≥45 years) and their spouses were interviewed in 150 randomly selected counties in China during 2011-2012, with a total of 17708 subjects recruited. Trained health professionals went door to door to administer the survey questionnaires, including socio-demographic factors (i.e., age, sex, living address, education), socio-economic factors (i.e., local Gross Domestic Product per capita), and medical history. Participants were asked whether they had knee pain at the time of the interview and whether they had been diagnosed arthritis by a physician. In this analysis we defined a subject as having SxOA if he/she responded to both questions positively

We divided subject's age into 4 groups: <50, 50-59, 60-69 and ≥70 years old, and their living localities into 6 regions: East, North, North-East, North-West, South-Central, and South-West. Individuals living in Hainan, Ningxia, Taiwan, and Tibet were not selected in this survey. Education was divided into 4 categories: no formal education, elementary school only, middle/high school only, and college or more education. Subject's economic status was divided into 3 categories: low (urban: 5530 to 20053 yuan; rural: 5530 to 16644 yuan), middle (urban: 20254 to 35767 yuan; rural: 16839 to